Contents of Volume 34

Number 1. JANUARY 1975

OPINION

Re: Nominations for Federal appointments. *E. L. Hess* 1

NEWS

Multiple myeloma 2

FASEB CONFERENCE

BIOLOGY OF DEVELOPMENT AND AGING
Chairman: *G. J. Thorbecke*

Introduction to FASEB Conference. *G. J. Thorbecke* 4

SESSION I

THEORETICAL CONCEPTS OF DEVELOPMENTAL AND AGE CHANGES
Session Chairman: *L. Orgel*

Implications of aging research for society. *B. L. Strehler* 5
Current theories of biological aging. *L. Hayflick* 9
Towards a theory of development. *L. Wolpert and J. H. Lewis* . 14

SESSION II

GENE REGULATION IN DIFFERENTIATION AND DEVELOPMENT
Session Chairman: *M. Potter*

Introductory remarks. *M. Potter* 21
Surface reorganization as an initial inductive event in the differentiation of prothymocytes to thymocytes. *E. A. Boyse and J. Abbott* 24
Germ line basis for antibody diversity. *A. R. Williamson, E. Premkumar and M. Shoyab* 28
Sequential expression of germ line genes in development of immunoglobulin class diversity. *A. R. Lawton, P. W. Kincade and M. D. Cooper* 33
Normal and altered phenotypic expression of immunoglobulin genes. *R. G. Mage* 40
Expression of specific clones during B cell development. *N. R. Klinman and J. L. Press* 47

SESSION III

FINITE VERSUS INFINITE PROLIFERATIVE AND FUNCTIONAL CAPACITIES OF CELLS
Session Chairman: *L. Hayflick*

Growth and death of diploid and transformed human fibroblasts. *R. Holliday* 51
Pathological implications of cell aging in vitro. *S. Goldstein, S. Niewiarowski and D. P. Singal* 56
Unlimited division potential of precancerous mouse mammary cells after spontaneous or carcinogen-induced transformation. *C. W. Daniel, B. D. Aidells, D. Medina and L. J. Faulkin, Jr.* 64
Restricted replicative life-span of diabetic fibroblasts in vitro: its relation to microangiopathy. *R. Vracko and E. P. Benditt* 68
Hayflick's hypothesis: an approach to in vivo testing. *U. Reincke, H. Burlington, E. P. Cronkite and J. Laissue* 71
Contributions of cytoplasmic factors to in vitro cellular senescence. *W. E. Wright and L. Hayflick* 76

SESSION IV

AGING OF HOMEOSTATIC CONTROL SYSTEMS
Session Chairman: *P. S. Timiras*

Introductory remarks. *P. S. Timiras* 81
Age-related changes in thermoregulatory capacity of tryptophan-deficient rats. *P. E. Segall and P. S. Timiras* 83
Zinc deficiency and brain development in the rat. *H. H. Sandstead, G. J. Fosmire, J. M. McKenzie and E. S. Halas* 86
Neuronal–glial interactions during development and aging. *A. Vernadakis* 89
Pituitary inhibitor of thyroxine. *W. D. Denckla* 96
Bioenergetic functions of sleep and activity rhythms and their possible relevance to aging. *R. J. Berger* 97
Changes in monoamine oxidase and monoamines with human development and aging. *D. S. Robinson* 103
Procaine HCl (Gerovital H3): A weak, reversible, fully competitive inhibitor of monoamine oxidase. *M. D. MacFarlane* 108
Discussion of papers on aging of homeostatic control systems .. 111

Number 2. FEBRUARY 1975

OPINION

Biology and scarcity. *H. G. Stever* 113

NEWS

Endoscopic diagnosis of renal mass 114

BOOKS RECEIVED 116

SPECIAL ARTICLES

Hormonal regulation of the activity of the fatty acid synthesizing system and of the malic enzyme concentration in liver cells. *A. G. Goodridge* 117
A worm's-eye view of biomedical journals. *E. Chernin* 124
Site visits for the review of grant applications to the National Institutes of Health: Views of an applicant and a scientist administrator. *D. H. Merritt and G. N. Eaves* 131

FASEB CONFERENCE

BIOLOGY OF DEVELOPMENT AND AGING (continued)
Chairman: *G. J. Thorbecke*

SESSION V

DEVELOPMENT AND AGING IN ORGAN SYSTEMS
Session Chairman: *W. E. Paul*

Ontogeny of mouse T-lymphoctye function. *D. E. Mosier and P. L. Cohen* 137
Differentiation of thymus cells. *I. L. Weissman, M. Small, C. G. Fathman and L. A. Herzenberg* 141
Development of B lymphocytes. *R. G. Miller and R. A. Phillips* .. 145
Ontogeny of B-lymphocyte function with respect to the heterogeneity of antibody affinity. *G. W. Siskind and E. A. Goidl* .. 151
Effects of aging on the differentiation and proliferation potentials of cells of the immune system. *T. Makinodan and W. H. Adler* 153

Age-related changes, including synergy and suppression, in the mixed lymphocyte reaction in long-lived mice. *M. Gerbase-DeLima, P. Meredith and R. L. Walford* 159
Panel discussion on T-cell heterogeneity. *R. Asofsky, D. Mosier, G. Bonnard, R. Tigelaar, H. Cantor, R. Gershon and I. Weissman* .. 162

SESSION VI

DEVELOPMENT AND AGING AT THE MOLECULAR LEVEL
Session Chairman: *H. N. Munro*

Introductory remarks. *H. N. Munro* 163
Hormonal regulation of hepatic P-enolpyruvate carboxykinase (GTP) during development. *R. W. Hanson, L. Reshef and J. Ballard* 166
Pre- and postnatal enzyme capacity for drug metabolite production. *J. R. Gillette and B. Stripp* 172
Impaired hormonal regulation of enzyme activity during aging. *R. C. Adelman* 179
Age-related changes in glucocorticoid binding by rat splenic leukocytes: Possible cause of altered adaptive responsiveness. *G. S. Roth* 183
Covalent modification of nuclear proteins during aging. *C. C. Liew and A. G. Gornall* 186
Effects of aging on ionic movements of atrial muscle. *P. B. Goldberg, S. I. Baskin and J. Roberts* 188
Enzymatic studies on the skeletal myosin A and actomyosin of aging rats. *G. Kaldor and B. K. Min* 191

SYMPOSIUM

IMPLICATIONS OF ENVIRONMENTAL PHARMACOLOGY AND TOXICOLOGY: FOOD SOURCES OF INCIDENTAL DRUG EXPOSURE
Chairman: *L. Golberg*

Introductory remarks. *L. Golberg* 195
Drug and chemical residues in domestic animals. *H. C. Mussman* 197
Clinical implications of the presence of drug residues in food. *W. L. Hewitt* 202
Indirect consequences of low-level use of antimicrobial agents in animal feeds. *J. R. Walton* 205
Influence on pharmacological experiments of chemicals and other factors in diets of laboratory animals. *P. M. Newberne* .. 209

Number 3. MARCH 1, 1975

Abstracts of papers presented at the Federation Annual Meeting 219

Number 4. MARCH 15, 1975

Exhibit Guide and Scientific Program 1209

Number 5. APRIL 1975

OPINION

Has the B in FASEB been forgotten? *I. Zelitch* 1307

NEWS

The Generally Recognized As Safe list. *G. W. Irving, Jr.* 1308

BOOKS RECEIVED 1309

SPECIAL ARTICLE

Investigations in enzyme replacement therapy in lipid storage diseases. *R. O. Brady, P. G. Pentchev and A. E. Gal* 1310

COLLOQUIUM

MEMBRANES, IONS AND IMPULSES
Honorary Chairman: *K. S. Cole*
Organizing Chairman: *J. W. Moore*

Dedication to Kacy Cole. *J. W. Moore* 1317
An essential ionized acid group in sodium channels. *B. Hille* . 1318
Solutions of the Hodgkin-Huxley equations modified for potassium accumulation in a periaxonal space. *W. J. Adelman, Jr., and R. FitzHugh* 1322
Noise measurements in axon membranes, *H. M. Fishman* 1330
Potassium and sodium current noise from squid axon membranes. *L. J. DeFelice, E. Wanke and F. Conti* 1338
Voltage clamp simulation. *J. M. Kootsey* 1343
Voltage transients in neuronal dendritic trees. *J. Rinzel* 1350
Propagation of action potentials in inhomogeneous axon regions. *F. Ramón, R. W. Joyner and J. W. Moore* 1357
Principles and applications of fluctuation analysis: a non-mathematical introduction. *C. F. Stevens* 1364
Effects of cholinergic compounds on the axon-Schwann cell relationship in the squid nerve fiber. *J. Villegas* 1370
Muscle activation: the current status. *R. J. Podolsky* 1374
Calcium transients in amphibian muscle. *S. R. Taylor, R. Rüdel and J. R. Blinks* 1379
Membrane particles and transmission at the triad. *C. Franzini-Armstrong* 1382
Electrical properties of the transverse tubular system. *L. L. Costantin* 1390
Axons, dendrites and synapses. *G. M. Shepherd* 1395
Motoneuron dendrites: role in synaptic integration: *J. N. Barrett* 1398

Number 6. MAY 1975

OPINION

Basic research and the quick payoff. *E. L. Hess* 1409

NEWS 1410

SPECIAL ARTICLE

Optimal locations of cancer centers on the basis of population access. *L. B. Ellwein and J. T. Kalberer, Jr.* 1411

LETTER

Potential biohazards of recombinant DNA molecules. *Reprinted from Science* 1417

SYMPOSIA

THE ETHICS OF HUMAN GENE MANIPULATION
Chairman: *J. Eisinger*

Introductory remarks. *J. Eisinger* 1418
Ethical and social aspects of experimental gene manipulation. *R. Roblin* 1421
The human uses of molecular genetics. *M. Lappé* 1425

ARTIFICIAL BLOOD
Chairman: *R. P. Geyer;* Cochairmen: *P. B. Sherer and J. M. Weiler*

Introduction. *E. R. Simon* 1428

SESSION I

INTRODUCTION TO ARTIFICIAL BLOOD MATERIALS
Session Chairman: *P. B. Sherer*

Coagulation, hemostasis, and plasma expanders: a quarter century enigma. *M. Alexander, K. Odake, D. Lawlor and M. Swanger* 1429
Chelating agents as possible artificial blood substitutes. *J. E. Baldwin* 1441
Fluorocarbons: properties and syntheses. *D. D. Dixon and D. G. Holland* 1444
Artificial blood emulsifiers. *I. R. Schmolka* 1449

SESSION II

HEMOGLOBIN SOLUTIONS AS BLOOD SUBSTITUTES
Session Chairman: *P. B. Sherer*

Hemoglobin solution as a plasma expander. *S. F. Rabiner* 1454
Cross-linked hemoglobins as potential plasma protein extenders. *W. Mok, D. Chen and A. Mazur* 1458
Hemoglobin solution: a potential oxygen transporting plasma volume expander. *H. R. Kaplan and V. S. Murthy* 1461
Acute oxygen supply by infusion of hemoglobin solutions. *K. Bonhard* 1466

SESSION III

FLUOROCARBON PREPARATIONS
Session Chairman: *J. M. Weiler*

Emulsions of perfluorinated solvents for intravascular gas transport. *L. C. Clark, Jr., E. P. Wesseler, S. Kaplan, M. L. Miller, C. Becker, C. Emory, L. Stanley, F. Becattini and V. Obrock* 1468
Preparation of perfluorodecalin emulsion, an approach to the red cells substitute. *K. Yokoyama, K. Yamanouchi, M. Watanabe, T. Matsumoto, R. Murashima, T. Daimoto, T. Hamano, H. Okamoto, T. Suyama, R. Watanabe and R. Naito* 1478
Perfluoro compounds as artificial erythrocytes. *H. A. Sloviter* . 1484
Studies on isolated rat liver perfused by perfluoro-compound emulsion. *V. Nováková, G. Birke, L.-O. Plantin and A. Wretlind* .. 1488
Fluorocarbon emulsions and cerebral microcirculation. *W. I. Rosenblum* 1493
"Bloodless" rats through the use of artificial blood substitutes. *R. P. Geyer* 1499
Evaluation of fluorochemicals for liquid membrane oxygenation. *H. W. Wallace, T. P. Stein and W. J. Asher* 1506
Effect of fluorocarbon emulsions on the mechanical fragility of normal and sickle cells: in vitro studies. *F. Padilla, J. O. Wear and W. H. Van Wagner* 1510
Perfluorocarbon emulsion in the perfusion of canine organs. *C. A. Hall* 1513
Vacuolar reaction in the spinal cord following intracardiac fluorocarbon–glutaraldehyde–formaldehyde perfusion: preliminary report. *R. L. Knobler* 1515
Fluorocarbon liver perfusion and fluorocarbon–glycine interaction. *H. Brown and W. G. M. Hardison* 1516

SESSION IV

GENERAL CONSIDERATIONS IN THE DEVELOPMENT OF BLOOD SUBSTITUTES
Session Chairman: *P. B. Sherer*

Artificial blood and the National Blood Policy *D. MacN. Surgenor and B. D. Mierzwa* 1518
Food and Drug Administration regulations and licensure. *L. F. Barker* 1522
Potential uses of artificial blood substitutes. *R. P. Geyer* 1525
Summary of workshop. *R. P. Geyer* 1529

Number 7. JUNE 1975

OPINION

On shipping biologicals. *R. F. Acker* 1533
On the Congressional support of biomedical research. *G. Litwack* 1534

LETTER

An open letter to Senator Adlai Stevenson. *F. A. Kummerow* .. 1535

NEWS

Primate Information Center 1536

SYMPOSIA

INSULIN—ITS SYNTHESIS, RELEASE, INTERACTION WITH RECEPTORS, AND MECHANISM OF ACTION
Chairman: *P. Cuatrecasas*

Studies on the mechanism of insulin release. *G. W. G. Sharp, C. Wollheim, W. A. Muller, A. Gutzeit, P. A. Trueheart, B. Blondel, L. Orci and A. E. Renold* 1537
Insulin biosynthesis and secretion. *M. A. Permutt and D. M. Kipnis* 1549
Insulin: interaction with membrane receptors and relationship to cyclic purine nucleotides and cell growth. *M. D. Hollenberg and P. Cuatrecasas* 1556
Relation of insulin receptors to insulin resistance. *D. H. Lockwood, J. N. Livingston and J. M. Amatruda* 1564
CORRECTION to Rosenblum article, May issue 1570

EFFECTS OF NUTRITION ON MATERNAL–INFANT INTERACTION
Chairmen: *D. J. Kallen, E. Pollitt and J. Mayer*

Introduction. *D. J. Kallen* 1571
Nutrition, behavioral development, and mother–child interaction in young rural children. *A. Chavez, C. Martinez and T. Yaschine* 1574
Maternal malnutrition and the neonatal environment. *D. A. Levitsky, T. F. Massaro and R. H. Barnes* 1583
Development of synchrony in mother–infant interaction in feeding and other situations. *E. B. Thoman* 1587
Failure to thrive: socioeconomic, dietary intake and mother–child interaction data. *E. Pollitt* 1593
Discussion. *T. B. Brazelton* 1598
Discussant's comments. *D. J. Kallen* 1601

CELL MARKER TECHNIQUES FOR NEUROANATOMICAL INVESTIGATIONS
Chairman: *R. J. Lasek*

Axonal transport and the use of intracellular markers in neuroanatomical investigations. *R. J. Lasek* 1603
Tracing neuronal connections with radioisotopes applied extracellularly. *A. Hendrickson* 1612
Intracellular dye techniques for neurobiology. *C. D. Tweedle* . 1616
The retrograde transport method. *J. H. LaVail* 1618

Number 8. JULY 1975

OPINION

Alliance for Engineering in Medicine and Biology. *J. H. Busser* 1625

NEWS

National Institute of Neurological Diseases and Stroke: Manpower Training and Support Programs 1627

BOOKS RECEIVED 1630

Number 9. AUGUST 1975

MEETING REPORT

The Fifth International Congress of the Transplantation Society. *R. E. Billingham and J. W. Streilein* 1631

SPECIAL ARTICLE

Applications of immunology to understanding mechanisms of human disease. *F. Miller* 1635

SPECIAL TOPIC

RESEARCH ACTIVITIES AT REGIONAL PRIMATE CENTERS

The Primate Research Centers Program of the National Institutes of Health. *W. J. Goodwin and J. Augustine* 1641
Human melanoma and leukemia associated antigens defined by nonhuman primate antisera. *H. F. Seigler, R. S. Metzgar, T. Mohanakumar and G. M. Stuhlmiller* 1642
Cytogenetics of the squirrel monkey (*Saimiri sciureus*). *T. C. Jones and N. S. F. Ma* 1646
Fetal hormones and their effect on the differentiation of the central nervous system in primates. *J. A. Resko* 1650
Immunology of borreliosis in nonhuman primates. *O. Felsenfeld and R. H. Wolf* 1656
Teratogenic effects of triamcinolone on the skeletal and lymphoid systems in nonhuman primates. *A. G. Hendrickx, R. H. Sawyer, T. G. Terrell, B. I. Osburn, R. V. Henrickson and A. J. Steffek* 1661
Tetrahydrocannabinol-induced manifestations of the "marihuana syndrome" in group-living macaques. *E. N. Sassenrath and L. F. Chapman* 1666
Effect of ambient levels of ozone on monkeys. *D. L. Dungworth, W. L. Castleman, C. K. Chow, P. W. Mellick, M. G. Mustafa, B. Tarkington and W. S. Tyler* 1670
Response of the nonhuman primate to polychlorinated biphenyl exposure. *J. R. Allen* 1675
Cyclical changes in the sexual skin of female rhesus: relationships to mating behavior and successful artificial insemination. *J. A. Czaja, S. G. Eisele and R. W. Goy* 1680
Endocrine and metabolic responses to cold in baboons. *C. C. Gale* 1685
Immunologic and morphologic effects of vasectomy in the rhesus monkey. *N. J. Alexander* 1692

SYMPOSIA

BIOLOGICAL ENERGY TRANSDUCTIONS
Chairman: *P. D. Boyer*

Mitochondrial ATP-P_i exchange complex and the site of uncoupling of oxidative phosphorylation. *Y. Hatefi, W. G. Hanstein, Y. Galante and D. L. Stiggall* 1699
Antibiotic inhibitors of mitochondrial ATP synthesis. *H. Lardy, P. Reed and C.-H. C. Lin* 1707
Coupling of "high-energy" phosphate bonds to energy transductions. *P. D. Boyer, B. O. Stokes, R. G. Wolcott and C. Degani* 1711
Chloroplast membranes and coupling factor conformations. *A. T. Jagendorf* 1718

FUNCTION OF MACROPHAGES
Chairman: *E. R. Unanue*

Introduction. *E. R. Unanue* 1723
Macrophage physiology. *Z. A. Cohn* 1725
Macrophage activation by lymphocyte mediators. *J. R. David* . 1730
Evaluation of the role of macrophages in immune induction. *E. R. Unanue and J. Calderon* 1737
Macrophage–lymphocyte interaction and antigen recognition. *A. S. Rosenthal, P. E. Lipsky and E. M. Shevach* 1743

NEWS 1750

OPINION

The right to know—public education for health. *D. C. Tosteson* .. 1751

SYMPOSIUM

CURRENT STATUS OF BEHAVIORAL PHARMACOLOGY
Chairman: *B. Weiss*

The future of behavioral pharmacology. *B. Weiss* 1754

SESSION I

Environmental Influences Affecting the Voluntary Intake of Drugs
Chairman: *J. R. Weeks*

Environmental influences affecting the voluntary intake of drugs: an overview. *J. R. Weeks* 1755
An experimental analysis of behavioral factors in drug dependence. *T. Thompson and R. Pickens* 1759
Second-order schedules of drug injection. *S. R. Goldberg, R. T. Kelleher and W. H. Morse* 1771
Behavioral functions of narcotic antagonists: response-drug contingencies. *J. H. Woods, D. A. Downs and J. Carney* 1777
Experimental models for the modification of human drug self-administration: Methodological developments in the study of ethanol self-administration by alcoholics. *G. Bigelow, R. Griffiths and I. Liebson* 1785

SESSION II

Interactions of Behavioral and Neurochemical Processes
Chairman: *P. L. Carlton*

On neurochemistry and behavior. *P. L. Carlton* 1793
Behavioral correlates of serotonin depletion. *J. A. Harvey, A. J. Schlosberg and L. M. Yunger* 1796
Neurochemical changes associated with schedule-controlled behavior. *S. B. Sparber* 1802
Serotonergic and cholinergic mechanisms during disruption of approach and avoidance behavior. *M. H. Aprison, J. N. Hingtgen and W. J. McBride* 1813
Catecholamines and drug–behavior interactions. *L. S. Seiden, R. C. MacPhail and M. W. Oglesby* 1823

SESSION III

Behavioral Toxicology
Chairman: *N. K. Mello*

Behavioral toxicology: A developing discipline. *N. K. Mello* .. 1832
Assessing the impact of low level chemicals on development: behavioral and latent effects. *J. M. Spyker* 1835
Amphetamine toxicity: behavioral and neuropathological indexes. *C. R. Schuster and M. W. Fischman* 1845
Psychophysical evaluation of toxic effects on sensory systems. *H. M. Hanson* 1852
Behavioral effects of mercury and methylmercury. *H. L. Evans, V. G. Laties and B. Weiss* 1858

SESSION IV

Contingencies of Reinforcement as Determinants of Drug Response
Chairman: *W. H. Morse*

Schedule-controlled behaviors as determinants of drug response. *W. H. Morse* 1868
Determinants of drug effects on punished responding. *D. E. McMillan* 1870
The role of discriminative stimuli in modulating drug action. *V. G. Laties* 1880
Reinforcement schedules and extrapolations to humans from animals in behavioral pharmacology. *L. Cook and J. Sepinwall* 1889
Discrete trial analysis of drug action. *G. A. Heise* 1898

Number 10. SEPTEMBER 1975

OPINION

Reassessment of Chinese traditional medicine. *C. P. Li* 1905

BOOKS RECEIVED

..... 1906

NEWS FROM THE FEDERATION

FASEB award for research in the life sciences—sponsored by the 3M Company 1907
Poster sessions—FASEB Annual Meeting, April 13–18, 1975. *R. S. Leisner and K. F. Heumann* 1908
The current status of manpower and training in pharmacology in the United States 1910

SYMPOSIA

Neurotransmitters
Chairman: *B. W. Agranoff*

Neurotransmitters and synaptic transmission. *B. W. Agranoff* . 1911
Biochemical identification of the mammalian muscarinic cholinergic receptor. *S. H. Snyder, K. J. Chang, M. J. Kuhar and H. I. Yamamura* 1915
Hypothalamic substance P as a candidate for transmitter of primary afferent neurons. *M. Otsuka, S. Konishi and T. Takahashi* 1922

Neurochemistry of Alcohol
Chairman: *R. A. Deitrich*

Introduction. *R. A. Deitrich* 1929
Direct effects of ethanol on the nervous system. *H. Kalant* ... 1930
Ethanol and brain ribosomes. *E. P. Noble and S. Tewari* 1942
Effect of peripheral ethanol metabolism on the central nervous system. *E. Majchrowicz* 1948
Physical dependence on alcohol in mice. *D. B. Goldstein* 1953
Involvement of biogenic amine metabolism in ethanol addiction. *R. A. Deitrich and V. G. Erwin* 1962

Supersensitivity in Smooth Muscle
Chairman: *W. W. Fleming*

Introduction and historical perspective. *W. W. Fleming* 1969
Supersensitivity to catecholamines after impairment of extraneuronal uptake or catechol-*O*-methyl transferase. *U. Trendelenburg and K.-H. Graefe* 1971
Role of calcium in postjunctional supersensitivity. *O. Carrier, Jr.* 1975
Electrophysiological correlations with postjunctional supersensitivity. *W. W. Fleming, P. R. Urquilla, D. A. Taylor and D. P. Westfall* 1981
Morphological and biochemical changes in supersensitive smooth muscle. *D. P. Westfall, T. J-F. Lee and R. E. Stitzel* .. 1985
Supersensitivity-like phenomena in the central nervous system. *S. K. Sharpless* 1990

Number 11. OCTOBER 1975

OPINION

Shortage of research funds. *S. Garb* 1999

SPECIAL ARTICLE

A biomedical information source: The National Clearinghouse for Alcohol Information. *M. E. Chafetz* 2001

SYMPOSIA

Local Regulatory Mechanisms in the Microcirculation
Chairman: *P. C. Johnson*

Introductory remarks. *P. C. Johnson* 2005
Metabolic factors in peripheral circulatory regulation. *F. J. Haddy and J. B. Scott* 2006
Oxygen tension: dependent or independent variable in local control of blood flow? *B. R. Duling and R. N. Pittman* 2012
Metabolic and myogenic factors in local regulation of the microcirculation. *P. C. Johnson and H. A. Henrich* 2020
Metabolic models of microcirculatory regulation. *H. J. Granger, A. H. Goodman and B. H. Cook* 2025
Pressure regulation in the microcirculation. *R. W. Gore and H. G. Bohlen* 2031

The Biology of Alcohol and Alcoholism
Chairmen: *E. Rubin and E. A. Smuckler*

Alcoholic drink, its production and effects. *E. A. Smuckler* 2038
Molecular injury to mitochondria produced by ethanol and acetaldehyde. *A. I. Cederbaum and E. Rubin* 2045
Liver hypermetabolic state after chronic ethanol consumption: hormonal interrelations and pathogenic implications. *Y. Israel, L. Videla and J. Bernstein* 2052
Differences in hepatic and metabolic changes after acute and chronic alcohol consumption. *C. S. Lieber, R. Teschke, Y. Hasumura and L. M. DeCarli* 2060
Significant pathways of hepatic ethanol metabolism. *R. G. Thurman, W. R. McKenna, H. J. Brentzel, Jr., and S. Hesse* 2075

Biochemical Function of Selenium and Its Interrelationships with Other Trace Elements and Vitamin E
Chairman: *H. L. Fuller*; Moderator: *R. M. Leach, Jr.*

Introduction. *R. M. Leach, Jr.* 2082
Biochemical function of selenium and its relation to vitamin E. *W. G. Hoekstra* 2083
Mechanisms of action of selenium and vitamin E in protection of biological membranes. *G. F. Combs, Jr., T. Noguchi and M. L. Scott* 2090
Interrelationships of selenium with other trace elements. *C. H. Hill* 2096

Number 12. NOVEMBER 1975

OPINION

Rotating program directors at NSF. *E. L. Hess* 2101

LETTERS

Longevity in vertebrates is proportional to relative brain weight. *R. S. Mallouk* 2102
Innovative directed research program in Kentucky. *A. A. Stein* 2103
Reply. *E. L. Hess* 2104

NEWS

..... 2105

SPECIAL ARTICLE

Science for medicine—time for another reappraisal. *E. J. Burger, Jr.* 2106

SPECIAL TOPIC

Clinical Laboratory Developments
Organizer–D. S. Young

Clinical laboratory developments. *D. S. Young* 2115
Nomenclature of laboratory results in medicine. *R. Dybkaer* .. 2116

Reference materials in clinical chemistry. *J. P. Cali* 2123
Advanced technology for the clinical laboratory. *C. D. Scott* .. 2127
Developments in therapeutic drug monitoring and alkaloid analysis. *M. A. Evenson* 2131
Screening for genetic disorders. *H. K. Berry* 2134
Specific protein assay. *R. F. Ritchie* 2139
Hormone analysis: bioassay and immunochemical methodology. *M. Fleisher and M. K. Schwartz* 2145
Computer interpretation of laboratory test results. *R. K. Hobbie and R. L. Reece* 2152
Laboratory screening: a critique. *D. L. Sackett* 2157
Interpretation of clinical laboratory data. *D. S. Young* 2162

SYMPOSIUM

SYNTHETIC FOOD ADDITIVES AS A SOURCE OF CALORIES: 1, 3-BUTANEDIOL
Chairman: *M. A. Mehlman*

Introduction. *M. A. Mehlman* 2166
Nutritional application and implication of 1,3-butanediol. *H. A. Dymsza* 2167
Nutritional and metabolic studies in humans with 1,3-butanediol. *R. B. Tobin, M. A. Mehlman, C. Kies, H. M. Fox and J. S. Soeldner* 2171
Use of 1,3-butanediol for lactation and growth in cattle. *J. W. Young* 2177
1,3-Butanediol catabolism in the rat. *M. A. Mehlman, R. B. Tobin and C. R. Mackerer* 2182
Butanediol and lipid metabolism. *D. R. Romsos, P. S. Belo and G. A. Leveille* 2186
Influence of 1,3-butanediol on blood glucose concentration and pancreatic insulin content of streptozotocin-diabetic rats. *C. R. Mackerer, R. N. Saunders, J. R. Haettinger and M. A. Mehlman* 2191

Information on travel to Anaheim 2196

Number 13. DECEMBER 1975

OPINION

The need for biological standards. *G. W. Nace* 2197

NEWS

..... 2199

BOOKS RECEIVED

..... 2200

SPECIAL ARTICLE

The Assembly of Life Sciences. *R. B. Stevens* 2201
In appreciation 2206

SYMPOSIA

GENES, CHROMOSOME LOCI AND DISEASE
Chairman: *H. C. Pitot*

Introduction. *H. C. Pitot* 2207
The fibrous structure of human chromosomes in relation to rearrangements and aberrations; a theoretical consideration. *G. F. Bahr* 2209
The mouse chromosome map. *O. J. Miller and D. A. Miller* ... 2218
Somatic cell genetic analysis of the interferon system. *R. P. Creagan, Y. H. Tan, S. Chen and F. H. Ruddle* 2222
In situ hybridization of chromosome loci. *P. M. Price and K. Hirschhorn* 2227

TURNOVER OF FREE FATTY ACIDS AND TRIGLYCERIDE
Chairman: *M. Vranic*

An overview. *M. Vranic* 2233
Turnover of plasma oleic acid measured by radio-gas chromatography. *A. Kuksis, N. Kovacevic, D. Lau and M. Vranic* 2238
Application of tracers in studying free fatty acid metabolism of various organs in vivo. *J. J. Spitzer* 2242
Turnover of individual free fatty acids in man. *L. Hagenfeldt* . 2246
Quantification of triglyceride transport in blood plasma: a critical analysis. *R. J. Havel and J. P. Kane* 2250
Triglyceride turnover: a comparison of simultaneous determinations using the radioglyceride and the lipolytic rate procedures. *G. Steiner and T. Murase* 2258
A preliminary model for human lipoprotein metabolism in hyperlipoproteinemia. *R. D. Phair, M. G. Hammond, J. A. Bowden, M. Fried, W. R. Fisher and M. Berman* 2263

BLOOD CELL DIFFERENTIATION
Chairman: *A. Cerami*

Humoral factors of blood cell differentiation. *A. Cerami* 2271
Colony stimulating factor and the regulation of granulopoiesis and macrophage production. *E. R. Stanley, G. Hansen, J. Woodcock and D. Metcalf* 2272
Regulation of blood cell differentiation. *J. E. Till, G. B. Price, T. W. Mak and E. A. McCulloch* 2279
Erythropoietin and the differentiation of red blood cells. *E. Goldwasser* 2285

INDEXES

Author 2293
Subject 2296

EMPLOYMENT OPPORTUNITIES

Included in advertising pages, each issue

PUBLIC AFFAIRS

Insert included in each issue at press time

Author Index to Volume 34[1]

Abbott, J., **1:** 24
Acker, R. F., **7:** 1533
Adelman, R. C., **2:** 179
Adelman, W. J., Jr., **5:** 1322
Adler, W. H., **2:** 153
Agranoff, B. W., **10:** 1911
Aidells, B. D., **1:** 64
Alexander, M., **6:** 1429
Alexander, N. J., **8:** 1692
Allen, J. R., **8:** 1675
Amatruda, J. M., **7:** 1564
Aprison, M. H., **9:** 1813
Asher, W. J., **6:** 1506
Asofsky, R., **2:** 162
Augustine, J., **8:** 1641

Bahr, G. F., **13:** 2209
Baldwin, J. E., **6:** 1441
Ballard, J., **2:** 166
Baltimore, D., **6:** 1417
Barker, L. F., **6:** 1522
Barnes, R. H., **7:** 1583
Barrett, J. N., **5:** 1398
Baskin, S. I., **2:** 188
Becattini, F., **6:** 1468
Becker, C., **6:** 1468
Belo, P. S., **12:** 2186
Benditt, E. P., **1:** 68
Berg, P., **6:** 1417
Berger, R. J., **1:** 97
Berman, M., **13:** 2263
Bernstein, J., **11:** 2052
Berry, H. K., **12:** 2134
Bigelow, G., **9:** 1785
Billingham, R. E., **8:** 1631
Birke, G., **6:** 1488
Blinks, J. R., **5:** 1379
Blondel, B., **7:** 1537
Bohlen, H. G., **11:** 2031
Bonhard, K., **6:** 1466
Bonnard, G., **2:** 162
Bowden, J. A., **13:** 2263
Boyer, H. W., **6:** 1417
Boyer, P. D., **8:** 1711
Boyse, E. A., **1:** 24
Brady, R. O., **5:** 1310
Brazelton, T. B., **7:** 1598
Brentzel, H. J., Jr., **11:** 2075
Brown, H., **6:** 1516
Burger, E. J., Jr., **12:** 2106
Burlington, H., **1:** 71
Busser, J. H., **8:** 1625

Calderon, J., **8:** 1737
Cali, J. P., **12:** 2123
Cantor, H., **2:** 162
Carlton, P. L., **9:** 1793
Carney, J., **9:** 1777
Carrier, O., Jr., **10:** 1975
Castleman, W. L., **8:** 1670
Cederbaum, A. I., **11:** 2045
Cerami, A., **13:** 2271
Chafetz, M. E., **11:** 2001
Chang, K. J., **10:** 1915
Chapman, L. F., **8:** 1666
Chavez, A., **7:** 1574
Chen, D., **6:** 1458
Chen, S., **13:** 2222
Chernin, E., **2:** 124
Chow, C. K., **8:** 1670
Clark, L. C., Jr., **6:** 1468
Cohen, P. L., **2:** 137
Cohen, S. N., **6:** 1417
Cohn, Z. A., **8:** 1725
Combs, G. F., Jr., **11:** 2090
Conti, F., **5:** 1338
Cook, B. H., **11:** 2025
Cook, L., **9:** 1889
Cooper, M. D., **1:** 33
Costantin, L. L., **5:** 1390
Creagan, R. P., **13:** 2222
Cronkite, E. P., **1:** 71
Cuatrecasas, P., **7:** 1556
Czaja, J. A., **8:** 1680

Daimoto, T., **6:** 1478
Daniel, C. W., **1:** 64
David, J. R., **8:** 1730
Davis, R. W., **6:** 1417
DeCarli, L. M., **11:** 2060
DeFelice, L. J., **5:** 1338
Degani, C., **8:** 1711
Deitrich, R. A., **10:** 1929, 1962
Denckla, W. D., **1:** 96
Dixon, D. D., **6:** 1444
Downs, D. A., **9:** 1777
Duling, B. R., **11:** 2012
Dungworth, D. L., **8:** 1670
Dybkær, R., **12:** 2116
Dymsza, H. A., **12:** 2167

Eaves, G. N., **2:** 131
Eisele, S. G., **8:** 1680
Eisinger, J., **6:** 1418
Ellwein, L. B., **6:** 1411
Emory, C., **6:** 1468
Erwin, V. G., **10:** 1962
Evans, H. L., **9:** 1858
Evenson, M. A., **12:** 2131

Fathman, C. G., **2:** 141
Faulkin, L. J., Jr., **1:** 64
Felsenfeld, O., **8:** 1656
Fischman, M. W., **9:** 1845
Fisher, W. R., **13:** 2263
Fishman, H. M., **5:** 1330
FitzHugh, R., **5:** 1322
Fleisher, M., **12:** 2145
Fleming, W. W., **10:** 1969, 1981
Fosmire, G. J., **1:** 86
Fox, H. M., **12:** 2171
Franzini-Armstrong, C., **5:** 1382
Fried, M., **13:** 2263

Gal, A. E., **5:** 1310
Galante, Y., **8:** 1699
Gale, C. C., **8:** 1685
Garb, S., **11:** 1999
Gerbase-DeLima, M., **2:** 159
Gershon, R., **2:** 162
Geyer, R. P., **6:** 1499, 1525, 1529
Gillette, J. R., **2:** 172
Goidl, E. A., **2:** 151
Golberg, L., **2:** 195
Goldberg, P. B., **2:** 188
Goldberg, S. R., **9:** 1771
Goldstein, D. B., **10:** 1953
Goldstein, S., **1:** 56
Goldwasser, E., **13:** 2285
Goodman, A. H., **11:** 2025
Goodridge, A. G., **2:** 117
Goodwin, W. J., **8:** 1641
Gore, R. W., **11:** 2031
Gornall, A. G., **2:** 186
Goy, R. W., **8:** 1680
Graefe, K.-H., **10:** 1971
Granger, H. J., **11:** 2025
Griffiths, R., **9:** 1785
Gutzeit, A., **7:** 1537

Haddy, F. J., **11:** 2006
Haettinger, J. R., **12:** 2191
Hagenfeldt, L., **13:** 2246
Halas, E. S., **1:** 86
Hall, C. A., **6:** 1513
Hamano, T., **6:** 1478
Hammond, M. G., **13:** 2263
Hansen, G., **13:** 2272
Hanson, H. M., **9:** 1852
Hanson, R. W., **2:** 166
Hanstein, W. G., **8:** 1699
Hardison, W. G. M., **6:** 1516
Harvey, J. A., **9:** 1796
Hasumura, Y., **11:** 2060
Hatefi, Y., **8:** 1699
Havel, R. J., **13:** 2250
Hayflick, L., **1:** 9, 76
Heise, G. A., **9:** 1898
Hendrickson, A., **7:** 1612
Hendrickx, A. G., **8:** 1661
Henrich, H. A., **11:** 2020
Henrickson, R. V., **8:** 1661
Herzenberg, L. A., **2:** 141
Hess, E. L., **1:** 1; **6:** 1409, **12:** 2101, 2104
Hesse, S., **11:** 2075
Heumann, K. F., **10:** 1908
Hewitt, W. L., **2:** 202
Hill, C. H., **11:** 2096
Hille, B., **5:** 1318
Hingtgen, J. N., **9:** 1813
Hirschhorn, K., **13:** 2227
Hobbie, R. K., **12:** 2152
Hoekstra, W. G., **11:** 2083
Hogness, D. S., **6:** 1417

[1] This index covers volume 34 with the exception of no. 3, the abstract issue, which carries its own author index, and no. 4, the exhibit guide. For each listing the bold face number refers to the issue number; the second number, or numbers, refer to the page number.

Holland, D. G., **6:** 1444
Hollenberg, M. D., **7:** 1556
Holliday, R., **1:** 51

Irving, G. W., Jr., **5:** 1308
Israel, Y., **11:** 2052

Jagendorf, A. T., **8:** 1718
Johnson, P. C., **11:** 2005, 2020
Jones, T. C., **8:** 1646
Joyner, R. W., **5:** 1357

Kalant, H., **10:** 1930
Kalberer, J. T., Jr., **6:** 1411
Kaldor, G., **2:** 191
Kallen, D. J., **7:** 1571, 1601
Kane, J. P., **13:** 2250
Kaplan, H. R., **6:** 1461
Kaplan, S., **6:** 1468
Kelleher, R. T., **9:** 1771
Kies, C., **12:** 2171
Kincade, P. W., **1:** 33
Kipnis, D. M., **7:** 1549
Klinman, N. R., **1:** 47
Knobler, R. L., **6:** 1515
Konishi, S., **10:** 1922
Kootsey, J. M., **5:** 1343
Kovacevic, N., **13:** 2238
Kuhar, M. J., **10:** 1915
Kuksis, A., **13:** 2238
Kummerow, F. A., **7:** 1535

Laissue, J., **1:** 71
Lappé, M., **6:** 1425
Lardy, H., **8:** 1707
Lasek, R. J., **7:** 1603
Laties, V. G., **9:** 1858, 1880
Lau, D., **13:** 2238
LaVail, J. H., **7:** 1618
Lawlor, D., **6:** 1429
Lawton, A. R., **1:** 33
Leach, R. M., Jr., **11:** 2082
Lee, T. J-F., **10:** 1985
Leisner, R. S., **10:** 1908
Leveille, G. A., **12:** 2186
Levitsky, D. A., **7:** 1583
Lewis, J. H., **1:** 14
Li, C. P., **10:** 1905
Lieber, C. S., **11:** 2060
Liebson, I., **9:** 1785
Liew, C. C., **2:** 186
Lin, C-H. C., **8:** 1707
Lipsky, P. E., **8:** 1743
Litwack, G., **7:** 1534
Livingston, J. N., **7:** 1564
Lockwood, D. H., **7:** 1564

Ma, N. S. F., **8:** 1646
MacFarlane, M. D., **1:** 108
Mackerer, C. R., **12:** 2182, 2191
MacPhail, R. C., **9:** 1823
Mage, R. G., **1:** 40
Majchrowicz, E., **10:** 1948
Mak, T. W., **13:** 2279
Makinodan, T., **2:** 153
Mallouk, R. S., **12:** 2102
Martinez, C., **7:** 1574
Massaro, T. F., **7:** 1583
Matsumoto, T., **6:** 1478
Mazur, A., **6:** 1458
McBride, W. J., **9:** 1813
McCulloch, E. A., **13:** 2279
McKenna, W. R., **11:** 2075
McKenzie, J. M., **1:** 86
McMillan, D. E., **9:** 1870
Medina, D., **1:** 64
Mehl, J. W., **9:** i
Mehlman, M. A., **12:** 2166, 2171, 2182, 2191
Mellick, P. W., **8:** 1670
Mello, N. K., **9:** 1832
Meredith, P., **2:** 159
Merritt, D. H., **2:** 131
Metcalf, D., **13:** 2272
Metzgar, R. S., **8:** 1642
Mierzwa, B. D., **6:** 1518
Miller, D. A., **13:** 2218
Miller, F., **8:** 1635
Miller, M. L., **6:** 1468
Miller, O. J., **13:** 2218
Miller, R. G., **2:** 145
Min, B. K., **2:** 191
Mohanakumar, T., **8:** 1642
Mok, W., **6:** 1458
Moore, J. W., **5:** 1317, 1357
Morse, W. H., **9:** 1771, 1868
Mosier, D. E., **2:** 137, 162
Muller, W. A., **7:** 1537
Munro, H. N., **2:** 163
Murase, T., **13:** 2258
Murashima, R., **6:** 1478
Murthy, V. S., **6:** 1461
Mussman, H. C., **2:** 197
Mustafa, M. G., **8:** 1670

Nace, G. W., **13:** 2197
Naito, R., **6:** 1478
Nathans, D., **6:** 1417
Newberne, P. M., **2:** 209
Niewiarowski, S., **1:** 56
Noble, E. P., **10:** 1942
Noguchi, T., **11:** 2090
Nováková, V., **6:** 1488

Obrock, V., **6:** 1468
Odake, K., **6:** 1429
Oglesby, M. W., **9:** 1823
Okamoto, H., **6:** 1478
Orci, L., **7:** 1537
Osburn, B. I., **8:** 1661
Otsuka, M., **10:** 1922

Padilla, F., **6:** 1510
Pentchev, P. G., **5:** 1310
Permutt, M. A., **7:** 1549
Phair, R. D., **13:** 2263
Phillips, R. A., **2:** 145
Pickens, R., **9:** 1759
Pitot, H. C., **13:** 2207
Pittman, R. N., **11:** 2012
Plantin, L.-O., **6:** 1488
Podolsky, R. J., **5:** 1374
Pollitt, E., **7:** 1593
Potter, M., **1:** 21
Premkumar, E., **1:** 28
Press, J. L., **1:** 47
Price, G. B., **13:** 2279
Price, P. M., **13:** 2227

Rabiner, S. F., **6:** 1454
Ramón, F., **5:** 1357
Reece, R. L., **12:** 2152
Reed, P., **8:** 1707
Reincke, U., **1:** 71
Renold, A. E., **7:** 1537
Reshef, L., **2:** 166
Resko, J. A., **8:** 1650
Rinzel, J., **5:** 1350
Ritchie, R. F., **12:** 2139
Roberts, J., **2:** 188
Robinson, D. S., **1:** 103
Roblin, R., **6:** 1417, 1421
Romsos, D. R., **12:** 2186
Rosenblum, W. I., **6:** 1493; **7:** 1570
Rosenthal, A. S., **8:** 1743
Roth, G. S., **2:** 183
Rubin, E., **11:** 2045
Ruddle, F. H., **13:** 2222
Rüdel, R., **5:** 1379

Sackett, D. L., **12:** 2157
Sandstead, H. H., **1:** 86
Sassenrath, E. N., **8:** 1666
Saunders, R. N., **12:** 2191
Sawyer, R. H., **8:** 1661
Schlosberg, A. J., **9:** 1796
Schmolka, I. R., **6:** 1449
Schuster, C. R., **9:** 1845
Schwartz, M. K., **12:** 2145
Scott, C. D., **12:** 2127
Scott, J. B., **11:** 2006
Scott, M. L., **11:** 2090
Segall, P. E., **1:** 83
Seiden, L. S., **9:** 1823
Seigler, H. F., **8:** 1642
Sepinwall, J., **9:** 1889
Sharp, G. W. G., **7:** 1537
Sharpless, S. K., **10:** 1990
Shepherd, G. M., **5:** 1395
Shevach, E. M., **8:** 1743
Shoyab, M., **1:** 28
Simon, E. R., **6:** 1428
Singal, D. P., **1:** 56
Siskind, G. W., **2:** 151
Sloviter, H. A., **6:** 1484
Small, M., **2:** 141
Smuckler, E. A., **11:** 2038
Snyder, S. H., **10:** 1915
Soeldner, J. S., **12:** 2171
Sparber, S. B., **9:** 1802
Spitzer, J. J., **13:** 2242
Spyker, J. M., **9:** 1835
Stanley, E. R., **13:** 2272
Stanley, L., **6:** 1468
Steffek, A. J., **8:** 1661
Stein, A. A., **12:** 2103
Stein, T. P., **6:** 1506
Steiner, G., **13:** 2258
Stevens, C. F., **5:** 1364
Stevens, R. B., **13:** 2201
Stever, H. G., **2:** 113
Stiggall, D. L., **8:** 1699
Stitzel, R. E., **10:** 1985
Stokes, B. O., **8:** 1711
Strehler, B. L., **1:** 5
Streilein, J. W., **8:** 1631
Stripp, B., **2:** 172
Stuhlmiller, G. M., **8:** 1642
Surgenor, D. MacN., **6:** 1518
Suyama, T., **6:** 1478
Swanger, M., **6:** 1429

Takahashi, T., **10:** 1922
Tan, Y. H., **13:** 2222
Tarkington, B., **8:** 1670

Taylor, D. A., **10:** 1981
Taylor, S. R., **5:** 1379
Terrell, T. G., **8:** 1661
Teschke, R., **11:** 2060
Tewari, S., **10:** 1942
Thoman, E. B., **7:** 1587
Thompson, T., **9:** 1759
Thorbecke, G. J., **1:** 4
Thurman, R. G., **11:** 2075
Tigelaar, R., **2:** 162
Till, J. E., **13:** 2279
Timiras, P. S., **1:** 81, 83
Tobin, R. B., **12:** 2171, 2182
Tosteson, D. C., **9:** 1751
Trendelenburg, U., **10:** 1971
Trueheart, P. A., **7:** 1537
Tweedle, C. D., **7:** 1616
Tyler, W. S., **8:** 1670

Unanue, E. R., **8:** 1723, 1737
Urquilla, P. R., **10:** 1981

Van Wagner, W. H., **6:** 1510
Vernadakis, A., **1:** 89
Videla, L., **11:** 2052
Villegas, J., **5:** 1370
Vracko, R., **1:** 68
Vranic, M., **13:** 2233, 2238

Walford, R. L., **2:** 159
Wallace, H. W., **6:** 1506
Walton, J. R., **2:** 205
Wanke, E., **5:** 1338
Watanabe, M., **6:** 1478
Watanabe, R., **6:** 1478
Watson, J. D., **6:** 1417
Wear, J. O., **6:** 1510
Weeks, J. R., **9:** 1755
Weiss, B., **9:** 1754, 1858
Weissman, I. L., **2:** 141, 162
Weissman, S., **6:** 1417
Wesseler, E. P., **6:** 1468
Westfall, D. P., **10:** 1981, 1985

Williamson, A. R., **1:** 28
Wolcott, R. G., **8:** 1711
Wolf, R. H., **8:** 1656
Wollheim, C., **7:** 1537
Wolpert, L., **1:** 14
Woodcock, J., **13:** 2272
Woods, J. H., **9:** 1777
Wretlind, A., **6:** 1488
Wright, W. E., **1:** 76

Yamamura, H. I., **10:** 1915
Yamanouchi, K., **6:** 1478
Yaschine, T., **7:** 1574
Yokoyama, K., **6:** 1478
Young, D. S., **12:** 2115, 2162
Young, J. W., **12:** 2177
Yunger, L. M., **9:** 1796

Zelitch, I., **5:** 1307
Zinder, N. D., **6:** 1417

Subject Index to Volume 34[1].

Acute oxygen supply by infusion of hemoglobin solutions, **6:** 1466
Advanced technology for the clinical laboratory, **12:** 2127
Aging
  Age-related changes, including synergy and suppression, in mixed lymphocyte reaction in long-lived mice, **2:** 159
  Age-related changes in glucocorticoid binding by rat leukocytes: Possible cause of altered adaptive responsiveness, **2:** 183
  Age-related changes in thermoregulatory capacity of tryptophan-deficient rats, **1:** 83
  Aging of homeostatic control systems, introductory remarks, **1:** 81
  Bioenergetic functions of sleep and activity rhythms and their possible relevance to aging, **1:** 97
  Changes in monoamine oxidase and monoamines with human development and aging, **1:** 103
  Contributions of cytoplasmic factors to in vitro cellular senescence, **1:** 76
  Covalent modification of nuclear proteins during aging, **2:** 186
  Current theories of biological aging, **1:** 9
  Development and aging at the molecular level, introductory remarks, **2:** 163
  Discussion of papers on aging of homeostatic control systems, **1:** 111
  Effects of aging on ionic movements of atrial muscle, **2:** 188
  Effects of aging on the differentiation and proliferation potentials of cells of the immune system, **2:** 153
  Enzymatic studies on the skeletal myosin A and actomyosin of aging rats, **2:** 191
  Impaired hormonal regulation of enzyme activity during aging, **2:** 179
  Implications of aging research for society, **1:** 5
  Neuronal-glial interactions during development and aging, **1:** 89
  Pathological implications of cell aging in vitro, **1:** 56
  Restricted replicative life-span of diabetic fibroblasts in vitro: its relation to microangiopathy, **1:** 68
Alcoholic drink, its production and effects, **11:** 2038
Amphetamine toxicity: behavioral and neuropathological indexes, **9:** 1845
Antibiotic inhibitors of mitochondrial ATP synthesis, **8:** 1707
Antimicrobial agents, low-level use in animal feeds, **2:** 205
Application of tracers in studying free fatty acid metabolism of various organs in vivo, **13:** 2242
Artificial blood
  and the National Blood Policy, **6:** 1518
  emulsifiers, **6:** 1449
  substitutes, potential users of, **6:** 1525
  workshop, summary, **6:** 1529
Assessing the impact of low level chemicals on development: behavioral and latent effects, **9:** 1835
Axonal transport and the use of intracellular markers in neuroanatomical investigations, **7:** 1603
Axons, dendrites and synapses, **5:** 1395

Behavior
  Behavioral correlates of serotonin depletion, **9:** 1796
  Behavioral effects of mercury and methylmercury **9:** 1858
  Behavioral functions of narcotic antagonists: response-drug contingencies, **9:** 1777
  Behavioral toxicology: a developing discipline, **9:** 1832
  Catecholamines and drug-behavior interactions, **9:** 1823
  Determinants of drug effects on punished responding, **9:** 1870
  Experimental analysis of behavioral factors in drug dependence, **9:** 1759
  The future of behavioral pharmacology, **9:** 1754
  Neurochemical changes associated with schedule-controlled behavior, **9:** 1802
  Neurochemistry and behavior, **9:** 1793
  Nutrition, behavioral development, and mother-child interaction in young rural children, **7:** 1574
  Reinforcement schedules and extrapolations to humans from animals in behavioral pharmacology, **9:** 1889
  Schedule-controlled behaviors as determinants of drug response, **9:** 1868
  Serotonergic and cholinergic mechanisms during disruption of approach and avoidance behavior, **9:** 1813
Biochemical
  function of selenium and its relation to vitamin E, **11:** 2083
  identification of the mammalian muscarinic cholinergic receptor, **10:** 1915
Bioenergetic functions of sleep and activity rhythms and their possible relevance to aging, **1:** 97
Biogenic amine metabolism and ethanol addiction, **10:** 1962
Biological aging, current theories, **1:** 9
Blood
  Acute oxygen supply by infusion of hemoglobin solutions, **6:** 1466
  Artificial blood and the National Blood Policy, **6:** 1518
  Artificial blood, an introduction, **6:** 1428
  Artificial blood emulsifiers, **6:** 1449
  "Bloodless" rats through the use of artificial blood substitutes, **6:** 1499
  Chelating agents as possible artificial blood substitutes, **6:** 1441
  Coagulation, hemostasis, and plasma expanders, a quarter century enigma, **6:** 1429
  Colony stimulating factor and the regulation of granulopoiesis and macrophage production, **13:** 2272
  Cross-linked hemoglobins as potential plasma protein extenders, **6:** 1458
  Effect of fluorocarbon emulsions on the mechanical fragility of normal and sickle cells: in vitro studies, **6:** 1510
  Emulsions of perfluorinated solvents for intravascular gas transport, **6:** 1468
  Erythropoietin and the differentiation of red blood cells, **13:** 2285
  Fluorocarbon emulsions and cerebral microcirculation, **6:** 1493
  Hemoglobin solution: a potential oxygen transporting plasma volume expander, **6:** 1461
  Hemoglobin solution as a plasma expander, **6:** 1454
  Humoral factors of blood cell differentiation, **13:** 2271
  Metabolic and myogenic factors in local regulation of the microcirculation, **11:** 2020
  Metabolic factors in peripheral circulatory regulation, **11:** 2005
  Metabolic models of microcirculatory regulation, **11:** 2025
  Oxygen tension: dependent or independent variable in local control of blood flow, **11:** 2012
  Perfluoro compounds as artificial erythrocytes, **6:** 1484
  Potential users of artificial blood substitutes, **6:** 1525
  Preparation of perfluorodecalin emulsion, an approach to the red cells substitute, **6:** 1478
  Pressure regulation in the microcirculation, **11:** 2031
  Regulation of blood cell differentiation, **13:** 2279
"Bloodless" rats through the use of artificial blood substitutes, **6:** 1499

Books Received

2: 116; **5:** 1309, **8:** 1630; **10:** 1906; **13:** 2200
1,3-Butanediol
  and lipid metabolism, **12:** 2186
  catabolism in the rat, **12:** 2182
  Influence of 1,3-butanediol on blood glucose concentration and pancreatic insulin content of streptozotocin-diabetic rats, **12:** 2191
  Nutritional application and implication of 1,3-butanediol, **12:** 2167
  Nutritional and metabolic studies in humans with 1,3-butanediol, **12:** 2171

[1] This index covers volume 34 with the exception of no. 3, the abstract issue, which carries a permuted subject index, and no. 4, the exhibit guide. For each listing the bold face number refers to the issue number; the second number refers to the page number.

Use of 1,3-butanediol for lactation and growth in cattle, **12:** 2177

Calcium
postjunctional supersensitivity, **10:** 1975
transients in amphibian muscle, **5:** 1379
Catecholamines and drug-behavior interactions, **9:** 1823
Chelating agents as possible artificial blood substitutes, **6:** 1441
Chloroplast membranes and coupling factor conformations, **8:** 1718
Clinical implications of the presence of drug residue in food, **2:** 202
Clinical laboratory
data, interpretation, **12:** 2162
developments, **12:** 2115
Coagulation, hemostasis, and plasma expanders, a quarter-century enigma, **6:** 1429
Cole, Kacy, dedication, **5:** 1317

Colloquium

Membranes, ions and impulses, **5:** 1317–1407
Colony stimulating factor and the regulation of granulopoiesis and macrophage production, **13:** 2272
Computer interpretation of laboratory test results, **12:** 2152
Contributions of cytoplasmic factors to in vitro cellular senescence, **1:** 76
Coupling of "high-energy" phosphate bonds to energy transductions, **8:** 1711
Covalent modification of nuclear proteins during aging, **2:** 186
Cross-linked hemoglobins as potential plasma protein extenders, **6:** 1458
Cyclical changes in the sexual skin of female rhesus: relationships to mating behavior and successful artificial insemination, **8:** 1680
Cytogenetics of the squirrel monkey (*Saimiri sciureus*), **8:** 1646

Determinants of drug effects on punished responding, **9:** 1870
Development
and aging at the molecular level, introductory remarks, **2:** 163
of B lymphocytes, **2:** 145
of synchrony in mother-infant interaction in feeding and other situations, **7:** 1587
Dietary chemical influence on laboratory animal experiments, **2:** 209
Differentiation of thymus cells, **2:** 141
Discrete trial analysis of drug action, **9:** 1898
Discriminative stimuli in modulating drug action, **9:** 1880
Division potential of precancerous mouse mammary cells after spontaneous or carcinogen-induced transformation, **1:** 64
Drug and chemical residues in domestic animals, **2:** 197

Effect(s)
of aging on ionic movements of atrial muscle, **2:** 188
of aging on the differentiation and proliferation potentials of cells of the immune system, **2:** 153
of ambient levels of ozone on monkeys, **8:** 1670
of cholinergic compounds on the axon-Schwann cell relationship in the squid nerve fiber, **5:** 1370
of ethanol on the nervous system, **10:** 1930, 1948
of fluorocarbon emulsions on the mechanical fragility of normal and sickle cells: in vitro studies, **6:** 1510
Electrical properties of the transverse tubular system, **5:** 1390
Electrophysiological correlations with postjunctional supersensitivity, **10:** 1981

Employment Opportunities

1: 28a; **2:** 19a; **4:** 109a; **5:** 29a; **6:** 27a; **7:** 27a; **8:** 31a; **9:** 19a; **10:** 37a; **11:** 27a; **12:** 33a; **13:** 23a
Emulsions of perfluorinated solvents for intravascular gas transport, **6:** 1468
Endocrine and metabolic responses to cold in baboons, **8:** 1685
Environmental
influences affecting the voluntary intake of drugs: an overview, **9:** 1755
pharmacology and toxicology: food sources of incidental drug exposure, introductory remarks, **2:** 195
Enzymatic studies on the skeletal myosin A and actomyosin of aging rats, **2:** 191
Erythropoietin and the differentiation of red blood cells, **13:** 2285
Essential ionized acid group in sodium channels, **5:** 1318
Ethanol
Alcoholic drink, its production and effects, **11:** 2038
and brain ribosome, **10:** 1942
Biomedical information source: The National Clearinghouse for Alcohol Information, **11:** 2001
Differences in hepatic and metabolic changes after acute and chronic alcohol consumption, **11:** 2060
Direct effects of ethanol on the nervous system, **10:** 1930
Effect of peripheral ethanol metabolism on the central nervous system, **10:** 1948
Experimental models for the modification of human drug self-administration: methodological developments in the study of ethanol self-administration by alcoholics, **9:** 1785
Involvement of biogenic amine metabolism in ethanol addiction, **10:** 1962
Liver hypermetabolic state after chronic ethanol consumption: hormonal interrelations and pathogenic implications, **11:** 2052
Molecular injury to mitochondria produced by ethanol and acetaldehyde, **11:** 2045
Physical dependence on alcohol in mice, **10:** 1953
Significant pathways of hepatic ethanol metabolism, **11:** 2075
Supersensitivity to catecholamines after impairment of extraneuronal uptake of catechol-*O*-methyl transferase, **10:** 1971
Ethical and social aspects of experimental gene manipulation, **6:** 1421
Ethics of human gene manipulation, introductory remarks, **6:** 1418
Evaluation
of fluorochemicals for liquid membrane oxygenation, **6:** 1506
of the role of macrophages in immune induction, **8:** 1737
Experimental analysis of behavioral factors in drug dependence, **9:** 1759
Experimental models for the modification of human drug self-administration: Methodological developments in the study of ethanol self-administration by alcoholics, **9:** 1785
Expression of specific clones during B cell development, **1:** 47

Failure to thrive: socioeconomic, dietary intake, and mother-child interaction data, **7:** 1593

FASEB Conference

Biology of development and aging, **1:** 4–111; **2:** 137–194

Federation News

Current status of manpower and training in pharmacology in the United States, **10:** 1910
FASEB award for research in the life sciences —sponsored by the 3M Company, **10:** 1907
Poster sessions—FASEB Annual Meeting, April 13–18, 1975, **10:** 1908
Fetal hormones and their effect on the differentiation of the central nervous system in primates, **8:** 1650
Fibrous structure of human chromosomes in relation to rearrangements and aberrations; a theoretical consideration, **13:** 2209
Fluorocarbon(s)
liver perfusion and fluorocarbon-glycine interaction, **6:** 1516
emulsions and cerebral microcirculation, **6:** 1493
properties and synthesis, **6:** 1444
Food and Drug Administration regulations and licensure, **6:** 1522
Future of behavioral pharmacology, **9:** 1754

Gene regulation in differentiation and development, introductory remarks, **1:** 21
Genetics
Fibrous structure of human chromosomes in relation to rearrangements and aberrations; a theoretical consideration, **13:** 2209
In situ hybridization of chromosome loci, **13:** 2227
Mouse chromosome map, **13:** 2218
Somatic cell genetic analysis of the interferon system, **13:** 2222
Germ line basis for antibody diversity, **1:** 28
Growth and death of diploid and transformed human fibroblasts, **1:** 51

Hayflick's hypothesis: an approach to in vivo testing, **1:** 71
Hemoglobin solution
a potential oxygen transporting plasma volume expander, **6:** 1461
as a plasma expander, **6:** 1454
Hepatic and metabolic changes after acute and chronic alcohol consumption, **11:** 2060

Hormonal regulation of hepatic P-enolpyruvate carboxykinase (GTP) during development, **2:** 166
Hormone analysis: bioassay and immunochemical methodology, **12:** 2145
Human
melanoma and leukemia associated antigens defined by nonhuman primate antisera, **8:** 1642
uses of molecular genetics, **6:** 1425
Humoral factors of blood cell differentiation, **13:** 2271
Hybridization of chromosome loci, in situ, **13:** 2227
Hypothalamic substance P as a candidate for transmitter of primary afferent neurons, **10:** 1922

Immunologic and morphologic effects of vasectomy in the rhesus monkey, **8:** 1692
Immunology of borreliosis in nonhuman primates, **8:** 1656
Impaired hormonal regulation of enzyme activity during aging, **2:** 179
Insulin
Influence of 1,3-butanediol on blood glucose concentration and pancreatic insulin content of streptozotocin-diabetic rats, **12:** 2191
Insulin biosynthesis and secretion, **7:** 1549
Insulin: interaction with membrane receptors and relationship to cyclic purine nucleotides and cell growth, **7:** 1556
Relation of insulin receptors to insulin resistance, **7:** 1564
Studies on the mechanism of insulin release, **7:** 1537
Intracellular dye techniques for neurobiology, **7:** 1616
Isolated rat liver perfused by perfluoro-compound emulsion, **6:** 1488

Laboratory
animal experiments, influence of dietary chemicals, **2:** 209
screening: a critique, **12:** 2157
Lactation and growth in cattle, with 1,3-butanediol, **12:** 2177

Letters

Innovative directed research program in Kentucky, **12:** 2103
Longevity in vertebrates is proportional to relative brain weight, **12:** 2102
Open letter to Senator Adlai Stevenson, **7:** 1535
Potential biohazards of recombinant DNA molecules, **6:** 1417
Reply to letter; Innovative directed research program in Kentucky, **12:** 2104
Liver hypermetabolic state after chronic ethanol consumption: hormonal interrelations and pathogenic implications, **11:** 2052
Lymphocytes
Age-related changes, including synergy and suppression, in the mixed lymphocyte reaction in long-lived mice, **2:** 159
Age-related changes in glucocorticoid binding by rat splenic leukocytes: Possible cause of altered adaptive responsiveness, **2:** 183
Development of B lymphocytes, **2:** 145
Macrophage activation by lymphocyte mediators, **8:** 1730
Ontogeny of B-lymphocyte function with respect to the heterogeneity of antibody affinity **2:** 151
Ontogeny of mouse T-lymphocyte function, **2:** 137

Macrophage
activation by lymphocyte mediators, **8:** 1730
lymphocyte interaction and antigen recognition, **8:** 1743
physiology, **8:** 1725
Maternal malnutrition and the neonatal environment, **7:** 1583
Mechanism of insulin release, **7:** 1537

Meeting Report

The Fifth International Congress of the Transplantation Society, **8:** 1631
Membrane particles and transmission at the triad, **5:** 1382
Metabolic
and myogenic factors in local regulation of the microcirculation, **11:** 2020
factors in peripheral circulatory regulation, **11:** 2006
models of microcirculatory regulation, **11:** 2025
Mitochondrial ATP-P_i exchange complex and the site of uncoupling of oxidative phosphorylation, **8:** 1699
Molecular injury to mitochondria produced by ethanol and acetaldehyde, **11:** 2045
Monoamine oxidase and monoamines with human development and aging, **1:** 103
Morphological and biochemical changes in supersensitive smooth muscle, **10:** 1985
Motoneuron dendrites: role in synaptic integration, **5:** 1398
Mouse chromosome map, **13:** 2218
Muscle activation: the current status, **5:** 1374

Neurochemical changes associated with schedule-controlled behavior, **9:** 1802
Neurochemistry and behavior, **9:** 1793
Neuronal-glial interactions during development and aging, **1:** 89
Neurotransmitters and synaptic transmission, **10:** 1911

News

6: 1410; **9:** 1750; **12:** 2105; **13:** 2199
Endoscopic diagnosis of renal mass, **2:** 114
The Generally Recognized as Safe list, **5:** 1308
Multiple myeloma, **1:** 2
National Institute of Neurological Diseases and Stroke: Manpower Training and Support Programs, **8:** 1627
Primate Information Center, **7:** 1536
Noise measurements in axon membranes, **5:** 1330
Nomenclature of laboratory results in medicine, **12:** 2116
Normal and altered phenotypic expression of immunoglobulin genes, **1:** 40
Nutrition
application and implication of 1,3-butanediol, **12:** 2167
behavioral development, and mother-child interaction in young rural children, **7:** 1574
and maternal-infant interaction, discussions, **7:** 1601
and metabolic studies in humans with 1,3-butanediol, **12:** 2171

Ontogeny
of B-lymphocyte function with respect to the heterogeneity of antibody affinity, **2:** 151
of mouse T-lymphocyte function, **2:** 137

Opinion

Alliance for Engineering in Medicine and Biology, **8:** 1625
Basic research and the quick payoff, **6:** 1409
Biology and scarcity, **2:** 113
Congressional support of biomedical research, **7:** 1534
Has the B in FASEB been forgotten?, **5:** 1307
Need for biological standards, **13:** 2197
Nominations for Federal appointments, **1:** 1
Reassessment of Chinese traditional medicine, **10:** 1905
Rotating program directors at NSF, **12:** 2101
Shipping biologicals, **7:** 1533
Shortage of research funds, **11:** 1999
The right to know—public education for heath, **9:** 1751
Oxygen tension: dependent or independent variable in local control of blood flow, **11:** 2012

Pathological implications of cell aging in vitro, **1:** 56
Pathways of hepatic ethanol metabolism, **11:** 2075
Perfluorocarbon emulsion in the perfusion of canine organs, **6:** 1513
Perfluoro compounds as artificial erythrocytes, **6:** 1484
Perfluorodecalin emulsion, an approach to the red cells substitute, **6:** 1478
Physical dependence on alcohol in mice, **10:** 1953
Pituitary inhibitor of thyroxine, **1:** 96
Potassium and sodium current noise from squid axon membranes, **5:** 1338
Pre- and postnatal enzyme capacity for drug metabolite production, **2:** 172
Preliminary model for human lipoprotein metabolism in hyperlipoproteinemia, **13:** 2263
Pressure regulation in the microcirculation, **11:** 2031
Primate Research Centers Program of the National Institutes of Health, **8:** 1641
Principles and applications of fluctuation analysis: a nonmathematical introduction, **5:** 1364
Procaine HCl (Gerovital H3): A weak, reversible, fully competitive inhibitor of monoamine oxidase, **1:** 108
Propagation of action potentials in inhomogeneous axon regions, **5:** 1357
Psychological evaluation of toxic effects on sensory systems, **9:** 1852

Public Affairs

See insert in each issue

Quantification of triglyceride transport in blood plasma: a critical analysis, **13:** 2250

Reference materials in clinical chemistry, **12:** 2123
Regulation of blood cell differentiation, **13:** 2279
Reinforcement schedules and extrapolations to humans from animals in behavioral pharmacology **9:** 1889
Relation of insulin receptors to insulin resistance, **7:** 1564
Response of the nonhuman primate to polychlorinated biphenyl exposure, **8:** 1675
Restricted replicative life-span of diabetic fibroblasts in vitro: its relation to microangiopathy, **1:** 68
Retrograde transport method, **7:** 1618

Schedule-controlled behaviors as determinants of drug response, **9:** 1868
Screening for genetic disorders, **12:** 2134
Second-order schedules of drug injection, **9:** 1771
Selenium
  Biochemical function of selenium and its relation to vitamin E, **11:** 2083
  Interrelationships of selenium with other trace elements, **11:** 2096
  Mechanisms of action of selenium and vitamin E in protection of biological membranes, **11:** 2090
Sequential expression of germ line genes in development of immunoglobulin class diversity, **1:** 33
Serotonergic and cholinergic mechanisms during disruption of approach and avoidance behavior, **9:** 1813
Solutions of the Hodgkin-Huxley equations modified for potassium accumulation in a periaxonal space, **5:** 1322
Somatic cell genetic analysis of the interferon system, **13:** 2222

Special Articles

  A biomedical information source: The National Clearinghouse for Alcohol Information, **11:** 2001
  Applications of immunology to understanding mechanisms of human disease, **8:** 1635
  Hormonal regulation of the activity of the fatty acid synthesizing system and of the malic enzyme concentration in liver cells, **2:** 117
  Investigations in enzyme replacement therapy in lipid storage diseases, **5:** 1310
  Optimal locations of cancer centers on the basis of population access, **6:** 1411
  Science and medicine: time for another reappraisal, **12:** 2106
  Site visits for the review of grant applications to the National Institutes of Health: Views of an applicant and a scientist administrator, **2:** 131
  The Assembly of Life Sciences, **13:** 2201
  Worm's-eye view of biomedical journals, **2:** 124

Special Topics

  Clinical laboratory developments, **12:** 2115–2165
  Research activities at Regional Primate Centers, **8:** 1641–1698
Specific protein assay, **12:** 2139
Supersensitivity
  -like phenomena in the central nervous system, **10:** 1990
  to cathecholamines after impairment of extraneuronal uptake of catechol-*O*-methyl transferase, **10:** 1971
Surface reorganization as an initial inductive event in the differentiation of prothymocytes to thymocytes, **1:** 24

Symposia

  Artificial blood, **6:** 1428–1531
  Biochemical function of selenium and its interrelationships with other trace elements and vitamin E, **11:** 2082–2100
  Biological energy transductions, **8:** 1699–1722
  Biology of alcohol and alcoholism, **11:** 2038–2081
  Blood cell differentiation, **13:** 2271–2292
  Cell marker techniques for neuroanatomical investigations, **7:** 1603–1624
  Current status of behavioral pharmacology, **9:** 1754–1903
  Effects of nutrition on maternal–infant interaction, **7:** 1571–1602
  Ethics of human gene manipulation, **6:** 1418–1427
  Function of macrophages, **8:** 1723–1748
  Genes, chromosome loci and disease, **13:** 2207–2232
  Implications of environmental pharmacology and toxicology: food sources of incidental drug exposure, **2:** 195–218
  Insulin—its synthesis, release, interaction with receptors, and mechanism of action; **7:** 1537–1569
  Local regulatory mechansms in the microcirculation, **11:** 2005–2037
  Neurochemistry of alcohol, **10:** 1929–1968
  Neurotransmitters, **10:** 1911–1928
  Supersensitivity in smooth muscle, **10:** 1969–1998
  Synthetic food additives as a source of calories: 1,3-butanediol, **12:** 2166–2196
  Turnover of free fatty acids and triglyceride, **13:** 2233–2270

T-cell heterogeneity, discussion, **2:** 162
Teratogenic effects of triamcinolone on the skeletal and lymphoid systems in nonhuman primates, **8:** 1661
Tetrahydrocannabinol-induced manifestations of the "marihuana syndrome" in group-living macaques, **8:** 1660
Theory of development, **1:** 14
Therapeutic drug monitoring and alkaloid analysis, **12:** 2131
Thymus cell, differentiation of, **2:** 141
Toxicity
  Amphetamine toxicity: behavioral and neuropathological indexes, **9:** 1845
  Behavioral toxicology: A developing discipline, **9:** 1832
  Implications of environmental pharmacology and toxicology: Food sources of incidental drug exposure, introductory remarks, **2:** 195
Tracing neuronal connections with radioisotopes applied extracellularly, **7:** 1612
Triglyceride turnover: a comparison of simultaneous determinations using the radioglyceride and the lipolytic rate procedures, **13:** 2258
Turnover
  of free fatty acids and triglyceride, an overview, **13:** 2233
  of individual free fatty acids in man, **13:** 2246
  of plasma oleic acid measured by radiogas chromatography, **13:** 2238

Vacuolar reaction in the spinal cord following intracardiac fluorocarbon-glutaraldehyde-formaldehyde perfusion: preliminary report, **6:** 1515
Voltage
  clamp stimulation, **5:** 1343
  transients in neuronal dendritic trees, **5:** 1350

Zinc deficiency and brain development in the rat, **1:** 86

INDEX